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Drift Station Biology
zooplankton taxonomy and
sorting programs

University of Southern California

prepared for
Office of Naval Research

JANUARY 1973

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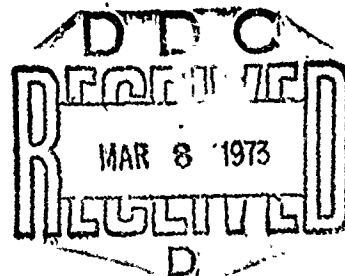
FINAL REPORT

on

DRIFT STATION BIOLOGY:

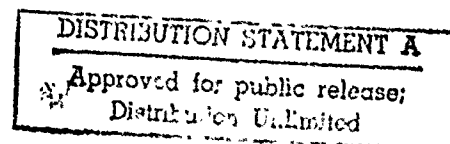
Zooplankton Taxonomy and Sorting Programs

September, 1969-October, 1972



Prepared under contract with the
Office of Naval Research
N00014-67-A-0269-0013
NR 307-270

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Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) University of Southern California Department of Biological Sciences Los Angeles, California 90007		2a. REPORT SECURITY CLASSIFICATION Unclassified	
3. REPORT TITLE Final Report on Drift Station Biology: Zooplankton Taxonomy and Sorting Programs.		2b. GROUP	
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final Report Sept. 1969-October 1972			
5. AUTHOR(S) (First name, middle initial, last name) Hector R. Fernandez			
6. REPORT DATE January, 1973	7a. TOTAL NO. OF PAGES 41 45	7b. NO. OF REFS	
8a. CONTRACT OR GRANT NO. N00014-67-A-0269-0013	8b. ORIGINATOR'S REPORT NUMBER(S)		
b. PROJECT NO. NR 307-270	8c. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
c.			
d.			
10. DISTRIBUTION STATEMENT Distribution of this document is unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office of Naval Research	
13. ABSTRACT The taxonomic studies of the USC Arctic Project are briefly summarized. This report includes a description of the practical taxonomic guides, the sorting program and studies which were derived from the sorting program. This work has two main objectives, first the identification of Arctic zooplankton, and second a more detailed study of the biology of some of the organisms, to form the basis for biochemical and physiological investigations. The report also includes a list of stations and of the organisms identified.			

Unclassified

Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
<p>Final Report, Drift Station Biology</p> <p>Zooplankton Taxonomy and Sorting Programs, USC.</p>						

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Table of Contents

Introduction.	1
Taxonomic Guides.	2
Zooplankton Sorting Program	
Sampling method.	6
Sampling processing.	6
Results of sorting program	8
Vertical Distribution and Life History of the	
Annelid <u>Pelagobia longicirrata</u>	8
The Growth Cycle and Related Vertical	
Distribution of the Pteropod, <u>Spiratella</u>	
<u>helicina</u> , in the Central Arctic Ocean	9
Taxonomy and Distribution of the Arctic	
Species of <u>Lucicutia</u> (Copepoda:Calanoida)	10
On the Ostracod Fauna of the Arctic Basin	10
Annual Vertical Distribuion of <u>Calanus</u>	
<u>hyperboreus</u> in the Central Arctic Ocean.	11
Contributions, 1969-1972.	13
Tables I-XIII: Zooplankton Collections from T-3	
between February 27, 1970 and February 2, 1973.	15

Introduction

The current activities of the USC Arctic Project range from taxonomic descriptions of Arctic zooplankton to physiological and biochemical investigations of the adaptations of selected species. In this report we summarize only those activities and findings which are immediately related to the taxonomic contributions of the project.

It is clear to all students of Arctic biology, that much remains to be done. When a present day biologist directs his attention to the Arctic, he is immediately faced with the problems of the identification of the organisms which are found there as well as with the small amount of background information on the biology of the animals which is usually necessary in order to design appropriate experiments. With these two problems in mind, the main thrust of our taxonomic effort has been directed towards the identification of the marine fauna and producing taxonomic guides which will enable any biologist to readily identify Arctic zooplankton. Furthermore, through systematic collections in terms of time and depth, we have been able to carry out additional studies on the biology of selected species which in our estimation contribute significantly to ecology of the Arctic Ocean.

This report covers the period from September 1969 until October 1972.

Taxonomic Guides

To assist other members of this project as well as other scientists interested in Arctic biology, we have prepared a series of practical taxonomic guides to aid in the identification of Arctic zooplankton. Of great help in the production of these guides was the fact that the University of Southern California had been engaged in surveys of the Arctic fauna for almost two decades. A large amount of taxonomic information was thus already on hand. The guides have been prepared in such a manner that even the non-specialist can use them readily. They have been published as technical reports entitled "Taxonomic Guides to Arctic Zooplankton", in six separate issues:

- Zooplankton (I): Amphipods of the Central Arctic
Euphausiids of the Arctic Basin
and Peripheral Seas
- Zooplankton (II): Medusae of the Central Arctic
Siphonophores of the Central Arctic
Ctenophores of the Central Arctic
- Zooplankton (III): Species of the Arctic Ocean Chaetognaths
Pteropods of the Central Arctic
Decapods of the Central Arctic
- Zooplankton (IV): Key to the Calanoid Copepods of the
Central Arctic Ocean
- Zooplankton (V): Pelagic Polychaetes of the Central
Arctic Basin
- Zooplankton (VI): Appendicularians of the Central Arctic
Mysids of the Arctic Ocean and
Confluent Seas
Field Guide to Arctic Zooplanktonic
Crustaceans
Ostracods of the Central Arctic

Complete reference to these guides is available in the list of

contributions (pp. 13-14).

Preparation of these guides required identification of organisms collected earlier in the central Arctic from the ice stations (ARLIS I, II, and T-3) and the nuclear submarines, Sea Dragon and Sea Skate. Scattered collections from peripheral seas made from drifting ice stations and coast guard cutters, Northwind (Sept. 1963), Burton Island (Sept. 1960), and Eastwind (July-August 1967) were also examined. Because material collected from peripheral seas was relatively small, the generalized guides to species in most cases, could only be constructed for central Arctic zooplankton. The guides, however, provide enough information of general nature which is applicable to the principal taxonomic groups and can be useful to scientists who work on zooplankton from the peripheral seas as well.

Each guide consists of dichotomous keys and illustrations of adult zooplankton anatomy. All have been constructed so that very little or no dissection of the specimen is necessary for identification. Pertinent references to the literature dealing specifically with the individual species as well as the taxonomic group have been included in each guide to provide additional information for anyone requiring more detailed information. Furthermore, discussions of taxonomic methods, terminology and discussions in depth on individual species are provided whenever possible.

During the preparation of these guides, established international specialists in the different taxonomic groups have been

called upon for comment and advice whenever it was required. We would like to express our gratitude to the following colleagues for their helpful advice.

Dr. A. Buchmann Hamburg, Germany	Appendicularians
Dr. B. Frost Department of Oceanography University of Washington	Copepods
Dr. J. C. Vaupel von Klein Rijks Museum of Natural History West Germany	Copepods
Dr. Cadet Hand Bodega Marine Laboratory	Medusae
Dr. G. O. Mackie University of British Columbia	Medusae
Dr. O. S. Tattersall Great Britain	Mysids
Dr. M. V. Angel National Institute of Oceanography Great Britain	Ostracods
Dr. G. B. Deevey Florida State Museum	Ostracods
Dr. C. W. Hart, Jr. Academy of Natural Sciences Pennsylvania	Ostracods
Dr. E. I. Schornikov Academy of Sciences USSR	Ostracods
Dr. K. Fauchald Hancock Foundation University of Southern California	Polychaetes
Dr. Olga Hartman Hancock Foundation University of Southern California	Polychaetes

Dr. John Garth
Hancock Foundation
University of Southern California

The guides were subjected to rigorous evaluation tests in which the principal criteria were accuracy and degree of ease in establishing the identification of the organism. This work has required, not only the examination of hundreds of samples taken throughout the years, but also comprehensive review of the literature of the Arctic fauna as far back as the late 18th century.

The responsibility for coordination and editorial work in the production of the guides was given to Ms. Hester Kobayashi.

Zooplankton Sorting Program

Sampling Method

Sorted under this program were samples collected from Ice Island, T-3, with 1 meter diameter, 215 micrometer mesh, closing nets towed vertically at a uniform rate of 20 meters per minute. Samples were collected from March 1970 to September 1970 by Mr. John Dawson and Mr. Lloyd Ellis, of USC, and from December 1970 to January 1972 by members of the University of Washington T-3 Program under Dr. T. S. English.

The following sampling protocol was used:

<u>March-Sept. 1970</u>		<u>December 1970-Jan. 1972</u>	
<u>Depth (m)</u>	<u>Increments (m)</u>	<u>Depth (m)</u>	<u>Increments (m)</u>
0 to 300	50	0 to 400	25
300 to 900	200	400 to 500	100
900 to 1500	300	500 to 900	200
1500 to 2000	500	900 to 1500	300
		1500 to 2000	500

Sample Processing

The preliminary processing of the collected samples was done under the direction of Mr. John Dawson. Undergraduates were trained to recognize the major groups of zooplankton prominent in the Arctic water column. This function has involved eight undergraduates partially supported under the Federal College Work Study Program.

With the help of these student assistants, samples were completely separated into the following general taxonomic groups and the numbers of the specimens recorded:

Taxonomic groups

chaetognatha
appendicularia(larvaceans)
nemertina
polychaeta
ctenophora
hydrozoa
scyphozoa
siphonophora
pteropoda
amphipoda
copepoda

The identification of animals to genera and species, only a small portion of which is complete, has been handled by specialists in the USC group. The data have been recorded in special tabulation sheets and arranged for easy retrieval for computer treatment in the future. All samples and data are stored in the Hancock Foundation of the University of Southern California. Tables I-XIII summarize the extent of the sorting work to the present.

Results of the Sorting Program

The sorting program had two principal objectives. First, it was designed to provide additional information of the faunal content of the central Arctic Basin and thereby enable us to produce more complete and accurate taxonomic guides. Second, through the systematic collection at discrete depths with closing nets over a two year period, it was possible to accumulate a wealth of synoptic information on the distribution of zooplankton in time and space over a long period of time. Analysis of this information has now yielded a large amount of information on vertical migrations and life cycles. This information in turn allowed us to select those key species which can serve as models in studying vertical migrations of zooplankton populations as well as those interactions between organisms and the environment which play an important role in the formation and behavior of sonar scattering layers of biological origin. The studies which already have been completed are summarized below.

Vertical Distribution and Life History of the Annelid Pelagobia longicirrata

Pelagobia longicirrata is the most common pelagic polychaete in the central Arctic Basin. It is a cosmopolitan species which is found not only in the Arctic but in deep waters of other oceans as well. Since very little is known about the biology of pelagic polychaetes it was decided to analyse the presence of Pelagobia in our plankton samples in order to study its vertical distribution and life cycle.

The results indicate that the majority of the animals are located between 300 and 500 meters throughout most of the year. The specimens found in this depth range are primarily breeding adults over 13 segments in size. In the spring and summer, the

percentage of animals which are found below 500 meters increases. However, most animals found below 500 meters tend to be less than 13 segments in size with the smallest specimens usually associated with the greatest depths. It was also found that the period of the year during which the percentage of animals increases below 500 meters is closely correlated with the breeding season. Our observations suggest that adults spawn between 300 and 500 meters in the spring and that the eggs or larvae, or both descend to depths below 1000 meters. Then as the larvae develop they ascend gradually.

This study was carried out by Mr. Douglas Yingst.

The Growth Cycle and Related Vertical Distribution
of the Pteropod, Spiratella helicina,
in the Central Arctic Ocean

The mechanisms which give rise to aggregations of plankton communities in the water column are not well understood. However, it is known that a number of factors both of environmental and biological origins can influence the formation and behavior of these aggregations. As an approach to this problem the pteropod S. helicina was selected as a model organism because of its presence in the 50 meter scattering layer in the Arctic, its relative abundance, dependence upon particulate material for food, and ease in recognition. Here we report on a study of its growth cycle and vertical distribution.

The growth and reproductive cycle of S. helicina in the central Arctic Ocean was studied by examining samples collected from along the drift paths of ice stations ARLIS I, II, and T-3. Shell diameters were measured, and gonadal development examined by histological means. Vertical distribution in the water column was also investigated.

S. helicina has an annual life cycle; spawning occurs mainly during the spring and summer months and the oldest animals die by March. Maturation of young into males occurs as the animals reach about 0.7 mm diameter (February-April) and to hermaphrodites by the time they reach about 0.8 mm (May). The young double their size during the months of October to January. This growth rate slows down at the time of sexual maturation and through the major spawning period but picks up again during the fall and winter. Growth and maturation during the winter months suggests that some food must be available to S. helicina during the dark period of the year when phytoplankton is least available.

The analysis of the vertical distribution indicates that the youngest juvenile forms tend to remain predominantly in the first

50 meters interval of the water column (0.2 mm to 0.4 mm), thereafter remaining within the first 100 meters until maturation. Animals larger than 0.9 mm seem to be dispersed in the water column during the peak period of primary productivity and concentrated in the top 100 m when food is less abundant.

This study was carried out by Ms. Hester Kobayashi.

Taxonomy and Distribution of the Arctic Species of Lucicutia (Copepoda: Calanoida)

Analysis of approximately 400 plankton hauls from the Arctic Ocean revealed the presence of Lucicutia polaris Brodsky, L. pseudopolaris Heptner, and L. anomala Brodsky in samples collected in deep waters. The two former species are closely related but differ in morphological and biological characteristics of the adults and juvenile stages. The male of L. anomala is described for the first time. These species have a wide geographical distribution in the Arctic Ocean. They inhabit the Arctic bottom water and show different but overlapping ranges of vertical distribution. L. pseudopolaris is most abundant at a depth of about 1500 m; L. polaris preferentially lives at a depth of about 2000 m; and L. anomala is found in waters deeper than 2000 m but is most abundant at depths exceeding 3000 m.

This study was performed by Mr. Julio Vidal and recently appeared in the Bull. So. Calif. Academy of Sciences. 70(1):23-30, 1971.

On the Ostracod Fauna of the Arctic Basin

This study involved the analysis of plankton and underice collections from drift stations ARLIS I, ARLIS II and T-3. Five species of ostracods have been identified, among which, one is new to science and one is a new record in the Arctic Ocean.

Conchoecia borealis maxima is the predominant species in the Basin and is found in collections from the first 1500 meters of the water column.

Conchoecia elegans is found together with C. borealis maxima in collections from the first 750 meters. The Arctic specimens appear larger than those collected at lower latitudes in the Atlantic. On the basis of the variation in sizes, it appears that a taxonomic revision should be considered.

Conchoecia skogsbergi, the 'long form' of the C. rotunda group, is very common in the Antarctic and north Atlantic, but is a new record in the Arctic. This species is similar to the species described by Angel (1968) but the present form is larger. Recent

investigation shows that this species also varies considerably in size at different latitudes, thus requires taxonomic revision too.

A female of a new species of Bathyconchoecia has been collected and is still under study.

Acetabulastoma arcticum, earlier described by Baker and Wong (1968) as Paradoxostoma rostratum, is a parasitic form which infests the amphipods, Gammarus wilkitzkii and Gammaracanthus loricatus. Although other species of gammarids have been examined, these are the only two species infested by Acetabulastoma.

Mr. Yuk maan Leung was assigned to study the ostracods.

Annual Vertical Distribution of Calanus hyperboreus in the Central Arctic Ocean

Calanus hyperboreus is the largest and one of the most abundant copepods in the central Arctic Basin. We have carried out a study of the biology of this copepod with special emphasis on vertical distribution of copepodite stages II through V and of the adult males and females over a two year period.

During the molting sequence from copepodite stage II to adult form, the most rapid growth occurs during July, presumably coinciding with the phytoplankton bloom. Our study of the vertical distribution patterns of the different stages suggest that there are three different types. Copepodite stages II to V show one type which is characterized by an undulating annual vertical migration. For example the maximum concentration of stages II-V copepodites occurs at depths between 300 and 500 meters in winter. During the spring there is a gradual migration towards the surface. At the end of the summer they descend once again gradually to remain at depths of 300 to 500 meters during winter.

Adult females are mainly found at depths of 100 meters in the spring, and as the season progresses they appear to descend at a rate of 50 meters per month. However during the summer they are found everywhere from the surface to a depth of 300 meters. It is thought that the females which migrate downwards in the spring remained there and that those found at the surface are newly molted females. In the fall the population centered at 150 meters. By December, however, they are distributed from near the surface to 450 meters. It is possible that those adult females which were concentrated in the fall at 150 meters remained near the surface during December, and those females found at greater depths are the result of molting from stage V copepodites which are found in deep water in December.

The vertical distribution of adult males centers between 400 and 800 meters and therefore is generally deeper than that of the females. They also differ in that they are only present during the spring and early summer. It is at this time when we found up to 30% of the females gravid.

Careful analysis of the life span of the various stages suggests that in the Arctic Basin C. hyperboreus has a generation length of about three years.

This work was carried out by Mr. John Dawson.

Contributions
1969-1972

Published:

Vidal, J. 1971. Taxonomy and Distribution of the Arctic Species of Lucicutia (Copepoda: Calanoida). Bull. So. Calif. Acad. Sciences. 70(1):23-30.

In preparation:

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Kobayashi, H. The Growth Cycle and Related Vertical Distribution Spiratella helicina in the Central Arctic Ocean.

Leung, Y. M. On the Ostracod Fauna of the Arctic Basin.

Yingst, D. Vertical Distribution and Life History of the Annelid Pelagobia longicirrata.

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Euphausiids of the Arctic
Basin and Peripheral Seas.....Y.M. Leung

USC Technical Report 2 (1970)
H. Kobayashi, ed.

Zooplankton (II): Medusae of the Central Arctic.....W.D. Shirley
and Y.M. Leung

Siphonophores of the Central
Arctic.....Y.M. Leung
Ctenophores of the Central
Arctic

USC Technical Report 3 (1970)
H. Kobayashi, ed.

Zooplankton (IV): Key to the Calanoid Copepods of
the Central Arctic Ocean.....J. Vidal

USC Technical Report 5 (1971)
H. Kobayashi, ed.

Zooplankton (V): Pelagic Polychaetes of the
Central Arctic Basin.....D.R. Yingst

USC Technical Report 1(1972)
H. Kobayashi, ed.

Zooplankton (VI): Appendicularians of the Central
Arctic.....Y.M. Leung
Mysids of the Arctic Ocean and
Confluent Seas
Field Guide to Arctic Zooplank-
tonic Crustaceans
Ostracods of the Central Arctic

USC Technical Report 2 (1972)
H. Kobayashi, ed.

Tables I-XIII*: Zooplankton Collections from
T-3 between February 27, 1970
and February 2, 1972

* code used in Tables
1=sorted to species
2=partially sorted to
species
3=not sorted to species

STATION NUMBER	DATE	TIME	LOCATION		COLLECTION DEPTH	BOTTOM	SORTED TO GROUPS NOT SORTED TO GROUPS	CHALYBEATE			APPENDICULARIA		
			LATITUDE N.	LONGITUDE W.				1	2	3	1	2	3
1D	2-27-70	1100	84° 22'	113° 32'	100-0	1514							
2D		1000			500-410		X						
3D	3-1-70	0933	84° 24'	113° 31'	100-0	1525	X						
4D		1010					X						
5D		1330			50-0								
6D		1345			100-50		X						
7D		1420			150-150		X						
8D		1510			200-250		X						
9D		1545			250-202		X						
10D		1630			300-250		X						
11D		1920			500-0		X						
12D		2020			500-300		X						
13D	3-2-70	1020	84° 23'	112° 40'	700-500	1537	X						
14D		1130			900-700		X						
15D	3-3-70	0930	84° 23'	113° 02'	1200-900	1580	X						
16D		1125			1500-1200		X						
17D	3-8-70	1340	84° 22'	113° 28'	50-0	1730	X						
18D		1355			100-50		X						
19D		1420			150-100		X						
20D		1715			200-150		X						
21D		1750			250-200		X						
22D		1825			300-250		X						
23D	3-9-70	1055	84° 21'	113° 28'	500-300	1715	X						
24D		1210			700-500		X						
25D	3-10-70	0909	84° 22'	113° 26'	900-700	1683	X						
26D		1154			1200-1000		X						
27D	3-11-70	1107	84° 23'	112° 37'	1200-900	1565	X						
28D	3-12-70	1121	84° 21'	112° 35'	1500-1200	1680	X						
29D	3-13-70	0851	84° 22'	112° 35'	100-50	1660	X						
30D		0912			50-0		X						
31D		0935			150-100		X						
32D		1005			250-200		X						
33D		1040			150-100		X						
34D		1105			300-250		X						
35D		-----			Surface		X						
36D	3-15-70	1300	84° 11'	113° 40'	50-0	1810	X						
37D		1320			100-50		X						
38D		1345			200-150		X						
39D		1415			150-100		X						
40D		1445			250-200		X						
41D		1520			300-250		X						
42D		1605			500-300		X						
43D		1705			700-500		X						
44D		1935	84° 11'	113° 40'	900-700		X						
45D		2305			1200-900		X						
46D	3-16-70	1135	84° 14'	114° 10'	1500-1200	2087	X						
47D	3-17-70	0910	84° 13'	114° 42'	100-0	2197	X						
48D		0925			100-0		X						
49D		1105			2000-1500	2190	X						
50D	3-17-70	1410			500-400								
51D		1455			400-300		X						
52D		1530			200-100		X						
53D	3-20-70	1435	84° 08'	114° 25'	50-0	2075	X						
54D		1500			150-100		X						
55D		1525			100-50		X						
56D		1555			200-150		X						
57D		1700			250-200		X						
58D		1737			300-250		X						
59D	3-22-70	0930	84° 09'	113° 56'	50-0	1997	X						
60D		0945			50-0		X						
61D		1006			100-50		X						
62D		1027			100-50		X						
63D		1050			150-100		X						
64D		1124			150-100		X						
65D		1230			200-150		X						
66D		1300			250-200		X						
67D		1325			200-150		X						
68D		1354			250-200		X						
69D		1425			300-250		X						
70D		1500			300-250		X						
71D		1545			500-300		X						
72D		1635			500-300		X						
73D		1700			700-500		X						
74D		2050			700-500		X						

STATION NUMBER	DATE	TIME	LOCATION		COLLECTION DEPTH	DEPTH	SORTED TO GROUPS NOT SORTED TO GROUPS	CHAETOGNATHA			APPENDICULARIA		
			LATITUDE N.	LONGITUDE W.				1	2	3	1	2	3
75D		2210			700-900		X						
76D		2330			900-700		X						
77D	3-24-70	1354	84° 11'	113° 25'	1200-900	1780	X						
78D		1535			1200-900		X						
79D	3-25-70	0945	84° 13'	113° 07'	1500-1200	1830	X						
80D		1155			1500-1200		X						
81D	3-29-70	1545	84° 18'	112° 20'	50-0	1776	X						X
82D		1600			100-50		X						X
83D		1625			150-100		X		X				
84D		1655			200-150		X		X				
85D		1955			250-200		X		X				
86D		2025			300-250		X		X				
87D		2107			500-300		X		X				X
88D		2200			700-500		X		X				
89D	3-30-70	1005	84° 18'	112° 39'	900-700	1763	X						
90D		1135			1200-900		X						
91D	3-31-70	1245	84° 18'	112° 38'	1500-1200	1791	X						
92D	4-5-70	1350	84° 18'	112° 41'	50-0	1790	X						
93D		1350			50-0		X						
94D		1405			100-50		X		X				
95D		1428			100-50		X						
96D		1450			150-100		X		X				
97D		1515			150-100		X		X				
98D		1537			200-150		X		X				
99D		1605			200-150		X		X				
100D		1678			250-200		X		X				
101D		1710			250-200		X		X				
102D		1924			300-250		X		X				
103D		2000			300-250		X		X				
104D		2100			500-300		X		X				
105D		2150			500-300		X		X				
106D		2250			700-500		X						
107D		2350			700-500		X						
108D	4-6-70	1120	84° 17'	112° 36'	900-720	1768		X					
109D	4-7-70	1230	84° 17'	112° 41'	900-720	1770		X					
110D	4-8-70	1115	84° 15'	112° 53'	900-700	1762	X						
111D		1235			900-700		X						
112D	4-9-70	1000	84° 16'	112° 36'	1200-900	1767	X						
113D		1140			1200-900		X						
114D	4-10-70	1135	84° 16'	112° 40'	1500-1200	1801	X						
115D		1325			1500-1175		X						
116D	4-14-70	0920	84° 24'	112° 06'	50-0	1377	X		X				
117D		0940			50-0		X						
118D		1000			100-50		X						
119D		1020			100-50		X		X				
120D		1045			150-100		X		X				
121D		1105			150-100		X		X				
122D		1155			200-150		X		X				
123D		1220			200-150		X		X				
124D		1345			250-200		X		X				
125D		1415			250-200		X		X				
126D		1450			300-250		X		X				
127D		1525			300-250		X		X				
128D		1610			500-300		X		X				
129D		1710			500-300		X		X				X
130D	4-15-70	1430	84° 22'	112° 04'	700-500	1552	X						
131D		1535			700-500		X						
132D		1650			900-700		X						
133D		1615			900-700		X						
134D	4-16-70	1230	84° 22'	111° 55'	1200-900	1549	X						
135D		1400			1200-900		X						
136D	4-17-70	1415	84° 22'	112° 04'	1500-1200	1523	X						
137D		1420			1500-1200		X						
138D	4-18-70	1450	84° 22'	111° 59'	100-0	1578		X					
139D		1520			200-100			X					
140D		1750			500-400			X					
141D	4-20-70	1205	84° 21'	111° 58'	50-0	1576	X			X			
142D		1220			100-50		X		X				
143D		1415			100-100		X		X				
144D		1545			200-150		X		X				
145D		1625			250-200		X		X				
146D		1705			300-250		X						
147D	4-21-70	1400	84° 20'	112° 09'	500-300	1554	X		X				

STATION NUMBER	DATE	TIME	LOCATION		COLLECTION METHOD	DEPTH (M)	SORTED TO GROUPS NOT SORTED TO GROUPS	CHAETOGNATHA			APPENDICULARIA		
			LATITUDE N.	LONGITUDE W.				1	2	3	1	2	3
148D	4-22-70	1555	84° 16'	112° 47'	700-900	1780	X						
149D		1720			900-700		X						
150D		2245			1200-900		X						
151D		1330			1500-1200		X						
152D		0200-1105			47		X						
153D	4-26-70	0200-1105	84° 17'	112° 29'	48	1738	X						
154D		0200-1105			49		X						X
155D		2320			50-0		X						X
156D		2335			50-0			X					
157D		2355			100-50		X		X		X		
158D	4-27-70	0020	84° 17'	112° 28'	100-50	1758		X					
159D		0045			150-100		X		X		X		
160D		0115			150-100			X					
161D		0115			200-150		X		X		X		
162D		0210			200-150			X					
163D	4-29-70	0920	84° 17'	112° 28'	250-200	1756	X		X				
164D		0950			250-200			X					
165D		1025			300-250		X		X				
166D		1100			300-250			X					
167D		1145			500-300		X		X				X
168D	4-30-70	1330	84° 17'	112° 27'	500-300	1738		X					
169D		1110			700-500		X		X				X
170D		1215			700-500			X					
171D		1330			1200-900		X		X				X
172D		1450			1200-900			X					
173D	5-2-70	1620	84° 16'	112° 29'	900-700	1728	X		X				
174D		1735			900-700			X					
175D		1150			1500-1200		X						X
176D		1340			1500-1200			X					
177D		0400-1630			47		X		X				
178D	5-3-70	0400-1630	84° 14'	112° 35'	46	1779	X		X				X
179D		2230			50-0		X						
180D		2255			100-50		X						
181D		2320			200-150		X		X				
182D		2345			150-100		X		X				
183D	5-4-70	0020	84° 09'	112° 55'	250-200	1840	X		X				
184D		0050			300-250		X		X				
185D		0250-2100			50		X		X				
186D		0250-2100			130		X		X				
187D		1130			500-300		X		X				
188D	5-5-70	1230	84° 07'	112° 43'	700-500	1850	X						
189D		1100			900-700		X						
190D		1130			1200-900		X						
191D		1320			1500-1200		X						
192D		1035			50-0		X		X				
193D	5-11-70	1045	84° 08'	112° 35'	50-0	1811	X						
194D		1100			100-50		X						X
195D		1115			100-50		X		X				
196D		1135			150-100		X		X				X
197D		1200			200-150		X		X				X
198D	5-12-70	1220	84° 08'	112° 35'	150-100	1811	X		X				
199D		1245			200-150		X		X				
200D		1310			250-200		X		X				X
201D		1340			250-200		X		X				
202D		1520			300-250		X		X				X
203D	5-13-70	1550	84° 08'	112° 35'	300-250	1811	X		X				
204D		1635			500-300		X		X				X
205D		1730			500-300		X		X				
206D		1130			700-500		X		X				
207D		1235			700-500		X		X				
208D	5-13-70	1403	84° 08'	112° 35'	900-700	1811	X		X				
209D		1525			900-700		X						
210D		1200			1200-900		X						
211D		1340			1200-900		X						
212D		1740			1500-1200		X						X
213D		1735			1500-1200		X						

STATION NUMBER	DATE	TIME	LOCATION		COLLECTION DEPTH	BOTTOM	SORTED TO GROUPS	NOT SORTED TO GROUPS	CHAETOGNATHA			APPENDICULARIA		
			LATITUDE N.	LONGITUDE W.					1	2	3	1	2	3
1E	6-11-70	0830	84° 04'	112° 36'	1500-1200	1922	X							
2E		1116			1200-900		X							
3E		1325			900-700		X							
4E	6-12-70	1447			700-500		X							
5E		0913			500-300		X			X				
6E		1045			300-250		X			X				
7E		1134			250-200		X			X				
8E		1215			200-150		X			X				X
9E		1318			150-100		X			X				X
10E	6-16-70	1345	84° 07'	112° 37'	100-50	1902	X			X				X
11E		1404			50-3		X							X
12E		1110			500-300			X						
13E		1206			300-250			X						
14E		1305			250-200			X						
15E		1348			200-150			X						
16E		1415			150-100			X						
17E		1440			100-50			X						
18E		1500			50-0			X						
19E	6-17-70	1045			50-0	1887	X						X	
20E		1057			50-0		X						X	
21E		1112			50-0		X						X	
22E		1125			50-0		X				X		X	
23E		1139			50-0		X							
24E		1151			50-0		X							
25E	6-22-70	1145	84° 07'	111° 54'	300-250	1869	X			X				X
25AE		1238			300-250		X			X				
26E		1340			250-200		X			X				X
26AE		1410			250-200		X			X				
27E		1435			200-150		X			X				
27AE		1533			200-150		X			X				
28E		1601			150-100		X			X				
28AE		1633			150-100		X			X				X
29E		1657			100-50		X			X				X
30E		1739			50-0		X			X				
30AE	6-23-70	1751			50-0	1855	X			X				
31E		1130			1500-1200		X			X				
32E		1420			1200-900		X							
33E		1558			900-700		X			X				
34E		1715			700-500		X						X	
35E		1950			500-400		X							
36E	6-28-70	2115	84° 20'	109° 13'	500-300	1663	X			X				X
37E		2210			300-250		X			X				
38E		2245			250-200		X			X				
39E		2318			200-150		X			X				
40E		2345			150-100		X			X				X
41E		0012			100-50		X							
42E	6-29-70	0033	84° 25'	107° 10'	50-3	1284	X							
43E		1509			1200-900		X						X	
44E		1720			900-700		X						X	
45E	7-6-70	1928	84° 30'	10° 44'	700-500		X			X				
46E		2125			500-300		X			X			X	
47E		1451			300-250		X			X			X	
48E		1530			250-200		X			X				
49E		1603			200-150		X			X				X
50E		1632			150-100		X			X				X
51E	7-13-70	1700	84° 47'	106° 28'	100-50	1445	X			X				X
52E		1719			50-0		X			X				X
53E		1355			500-300			X						
54E		1457			300-250			X						
55E		1533			250-200			X						
56E		1605			200-150			X						
57E		1634			150-100			X						
58E		1704			100-50			X						
59E		1725			50-3			X						
60E		1739			75-15		X			X				X
61E	7-20-70	1808	84° 41'	106° 28'	75-15		X			X				X
62E		0825			1400-1200		X			X				X
63E		1045			1200-900		X			X				
64E		1248			900-700		X							
65E		1435			700-500		X							
66E		1600			500-300		X							X
67E		1714			300-250		X							X
68E		1740			250-200		X							X
69E														
70E														

24

STATION NUMBER	DATE	TIME	LOCATION		COLLECTION DEPTH	DEPTH	SORTED TO GROUPS NOT SORTED TO GROUPS	CHAETOGNATHA	APPENDICULARIA		
			LATITUDE N.	LONGITUDE W.					1	2	3
60E		1825			200-150		X	X			X
70E		1853			150-100		X	X			X
71E		1915			100-50		X	X			X
72E		1943			50-3		X	X			X
73E	7-24-70	1700	84° 34'	106° 51'	200-100	1270	X	X			X
74E		1740			150-0			X			
75E	7-28-70	1040	84° 38'	106° 23'	500-300	1342	X	X			X
76AE		1515			500-300		X	X			X
76E		1620			300-250		X	X			X
76AE		1655			300-250		X	X			X
77E	7-29-70	0815			250-200		X	X			X
77AE		0855			250-200		X	X			X
78E		0928			200-150		X	X			X
78AE		0957			200-150		X		X		X
79E		1030			150-100		X	X			X
79AE		1056			150-100		X	X			X
80E		1127			100-50		X	X			X
80AE		1147			100-50		X	X			X
81E		1208			50-0		X	X			X
81AE		1226			50-0			X			X
82E	8-4-70	1140	84° 29'	106° 57'	1200-900	1300	X				X
83E		1402			700-500		X				X
84E		1527			900-700		X				X
85E		1615			500-300		X	X			X
86E	8-5-70	1442			300-255		X	X			X
87E		1550			250-200		X	X			X
88E		1622			200-150		X		X		X
89E		1655			150-100		X	X			X
90E		1717			100-50		X	X			X
91E		1737			50-0			X			X
92E	8-10-70	1113	84° 27'	106° 59'	500-300	1266	X	X			X
93E		1326			300-250		X	X			X
94E		1404			250-200		X	X			X
95E		1423			200-150		X	X			X
96E		1506			150-100		X				X
97E		1530			100-50		X	X			X
98E		1553			50-0		X				X
99E	8-18-70	2255	84° 14'	106° 34'	500-300	1660	X	X			X
99AE		2354			500-300		X	X			X
100E	8-19-70	1920			300-250	1668	X	X			X
100AE		2000			300-250		X	X			X
101E		2040			250-200		X	X			X
101AE		2114			250-200		X	X			X
102E		2150			200-150		X	X			X
102AE		2216			200-150		X				X
103E		2250			150-100		X	X			X
103AE		2315			150-100		X	X			X
104E		2342			100-50		X	X			X
104AE	8-20-70	0001			100-50	1694		X			X
105E		0020			50-0		X	X			X
105AE		0032			50-0		X	X			X
106E	8-22-70	2230			50-0	1643		X			X
106AE		2244			50-0			X			X
106BE		2309			50-0			X			X
107E	8-23-70	0012			150-50			X			X
108E		0028			100-50			X			X
109E	8-2-70	2030	84° 22'	105° 06'	100-500	1401		X			X
110E		2215			100-0			X			X
110AE		2242			100-0			X			X
110BE		2303			100-0			X			X
111E	8-30-70	1925	84° 24'	104° 22'	1250-900	1385	X	X			X
112E		2135			900-700		X	X			X
113E		2305			700-500		X				X
114E	8-31-70	0050			500-300		X	X			X
115E		1844			300-250		X	X			X
116E		1930			250-200		X	X			X
117E		2004			200-150		X		X		X
118E		2034			150-100		X	X			X
119E		2107			100-50		X	X			X
120E		2139			50-0			X			X
120AE		2153			50-0		X	X			X
121E	9-7-70	1921	84° 31'	102° 42'	500-300	1742		X			X
122E		2015			300-250			X			X

STATION NUMBER	DATE	TIME	LOCATION		COLLECTION DEPTH	BOTTOM DEPTH	SORTED TO GROUPS	NOT SORTED TO GROUPS	CHAETOGNATHA			APPENDICULARIA		
			LATITUDE N.	LONGITUDE W.					1	2	3	1	2	3
123E	9-13-70	2053	84° 51'	99° 38'	250-200	1982		X						
124E		2145			200-150			X						
125E		2213			150-100			X						
126E		2248			100-50			X						
127E		2310			50-0			X						
128E		1913			50-0			X						
129E		2003			50-0			X						
130E		2035			50-0			X						
131E		2058			50-0			X						
132E		2130			50-0			X						
133E	9-20-70	1907	84° 49'	99° 41'	500-300	1945	X							
133AE		2009			500-300		X							X
134E		2100			300-250		X							X
134AE		2136			300-250		X							
135E		2210			250-200		X							
135AE		2241			250-200		X							
136E		2306			200-150		X							X
136AE		2331			200-150		X							X
137E		2353			150-100		X							
137AE		0023			150-100		X							X
138E	9-21-70	0047			100-50		X							
138AE		0107			100-50		X							X
139E		0129			50-0		X							X
139AE		0150			50-0		X							X
1B	12-15-70	-----	85° 11'	96° 34'	10-25	1500	X							X
2B		-----			25-50		X							
3B		-----			50-75		X							
4B		-----			75-100		X							
5B		-----			100-125		X							
6B		-----			125-150		X							
7B		-----			150-175		X							
8B		-----			175-200		X							
9B		-----			225-200		X							X
10B		-----			250-225		X							X
11B	12-16-70	-----	85° 11'	96° 40'	275-250	1611	X							X
12B		-----			300-275		X							X
13B		-----			325-300		X							X
14B		-----			350-325		X							
15B		-----			375-350		X							
16B		-----			400-375		X							X
17B		-----			500-400		X							X
18B		-----			700-500		X							X
19B		-----			900-700		X							X
20B		-----			1200-900		X							X
21B	12-19-70	-----	85° 11'	96° 32'	1500-1200	1572	X							X
22B	12-27-70	1705	85° 14'	96° 19'	25-10	1593	X							
23B		1720			50-25		X							X
24B		2030			75-50		X							
25B		2040			100-75		X							X
26B		2100			125-100		X							X
27B		2120			150-125		X							X
28B		2140			175-150		X							X
29B		2200			200-175		X							X
30B		2225			225-200		X							X
31B		2255			250-225		X							X
32B	12-29-70	2320	85° 16'	96° 16'	275-250	1242	X							X
33B		2350			300-275		X							X
34B		0025			325-300		X							X
35B		0100			350-325		X							X
36B		1355			375-350		X							X
37B		1435			400-375		X							X
38B		1515			500-400		X							X
39B		1950			700-500		X							X
1L	2-24-71	0525	85° 17'	92° 30'	-----	1650		X						
2L	2-25-71	0200	85° 16'	92° 30'	-----	-----		X						
3L		0432			1200-887	-----	X							
4L		0120			900-700	-----	X							
5L		0250			700-500	-----	X							
6L		0410			500-400	-----	X							
7L		0505			400-375	-----	X							
8L		0555			375-345	-----	X							X
9L		0608			350-325	1762	X							
10L		0651			325-300	-----	X							
	2-28-71		85° 17'	91° 57'										

Table VI

STATION NUMBER	DATE	TIME	LOCATION		COLLECTION DEPTH	WATIN DEPTH	SORTED TO GROUPS NOT SORTED TO GROUPS	CHAETOGNATHA			APPENDICULARIA		
			LATITUDE N.	LONGITUDE W.				1	2	3	1	2	3
11L		0731			300-275		X		X		X		
12L		0800			275-250		X		X		X		
13L		0827			250-225		X		X		X		
14L		0853			-----			X					
15L		0916			225-201		X		X		X		
16L		0943			200-176		X		X		X		
17L		1003			175-150		X		X		X		
18L	3-1-71	1218	85° 17'	91° 55'	150-125	1662	X		X		X		
19L		1244			125-101		X		X		X		
20L		1302			100-77		X		X		X		
21L		1324			75-50		X		X		X		
22L		1340			50-24		X		X				
23L		1352			25-10		X		X				
24L		1413			10-0		X						
30L	3-15-71	0103	85° 29'	89° 11'	1500-1205	1913	X						
31L	3-16-71	0554	85° 29'	88° 51'	1200-904	-----	X			X			
32L	3-20-71	0145	-----	-----	900-701	-----	X			X		X	
33L		0452	-----	-----	700-501	-----	X		X		X		
34L		0558	-----	-----	500-402	-----	X		X		X		
35L		0648	-----	-----	400-378	-----	X		X				
36L		0831	-----	-----	375-350	-----	X			X			
37L		0904	-----	-----	350-326	-----	X		X				
38L		0935	-----	-----	325-301	-----	X		X				
39L	3-21-71	1154	-----	-----	300-276	-----	X		X				
40L		1356	-----	-----	276-252	-----	X		X				
41L	3-22-71	0604	-----	-----	250-226	-----	X		X				
42L	3-23-71	0633	85° 23'	89° 05'	225-200	2610	X		X		X		
43L	3-24-71	0835	85° 24'	88° 37'	200-176	2016	X		X		X		
44L		0853			175-150		X		X				X
45L		0920			150-124.5		X		X				
46L		0936			125-100		X		X				
47L		0952			100-75		X		X		X		
48L		1010			75-50		X		X		X		
49L		1031			50-25		X		X		X		
50L		1048			25-10		X		X				
51L		1103			10-0			X					
1M	4-10-71	0900	85° 30'	89° 00'	10-0	2000	X		X				
2M		0925			25-10		X		X		X		
3M		1015			50-25		X		X			X	
4M		1040			75-50		X		X		X		
5M		1100			100-75		X			X	X		
6M		1122			125-100		X		X		X		
7M		1150			150-125		X		X		X		
8M		1305			175-150		X		X		X		
9M		1525			200-175		X		X		X		
10M		1614			225-200		X		X		X		
11M		1647			250-225		X		X		X		
12M		1724			275-250		X		X		X		
13M		1425			300-275		X		X		X		
14M	4-11-71	1530			325-300		X		X			X	
15M		1605			350-325		X				X		
16M		1638			375-350		X				X		
17M		1715			400-375		X				X		
18M		1944			500-402		X		X		X		
19M		2103			700-501		X				X		
20M	4-16-71	2158			900-701		X				X		
21M		2055			1200-900		X				X		
22M	4-17-71	0236			1500-1202		X						
1M	5-1-71	1625	85° 38'	86° 16'	25-10	2020	X						
2M	5-2-71	1111			50-25		X		X		X		
3M	5-3-71	1130			100-75	2055	X		X		X		
4M		1147			75-50		X		X		X		
5M		1405			125-100		X		X		X		
6M		1435			150-125		X		X		X		
7M		1805			175-150		X		X		X		
8M		1824			200-175		X		X		X		
9M	5-4-71	1112			225-200		X		X		X		
10M		1140			250-225		X		X			X	
11M		1300			275-250		X		X		X		
12M		1327			300-275		X		X		X		
13M		1350			325-300		X		X				
14M		1428			350-325	2055	X		X				
15M		1501			375-350		X		X				

POLYCHAETA			CTENOPHORA			HYDROBIA			SCYPHOZOA			SIPHONOPHORA			PTEROPODA			AMPHIPODA			COPEPODA (LARGE)			COPEPODA (SMALL)			DECAPODA			EUPHAUSTACEA			ISOPODA			MYSIDACEA			OSTRACODA				
1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3					
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x	x		x	x		x	x					x	x					x			x	x																					

STATION NUMBER	DATE	TIME	LOCATION		COLLECTION DEPTH	BOTTOM DEPTH	SORTED TO GROUPS	CHAETOGNATHA	APPENDICULARIA
			LATITUDE N.	LONGITUDE W.				1 2 3	1 2 3
14M	5-21-71	1533	85° 19'	88° 08'	400-375	2054	X	X	X
17M		1620			500-400		X	X	
18M		1705			700-502		X	X	
19M		2009			900-702		X		
20M		1130			1200-899		X		
21M		1630			1500-1200		X		
1M		1330			25-10		X		
2M		1340			50-25		X		
3M		1350			75-50		X	X	
4M		1405			100-75		X	X	X
5M		1419			125-100		X	X	X
6M		1416			150-125		X	X	X
7M		1455			175-150		X	X	X
8M		1500			200-175		X	X	X
9M		1531			225-200		X	X	X
10M	5-22-71	1554	85° 18'	88° 13'	250-225	2022	X	X	X
11M		1711			375-250		X	X	X
12M		1736			300-275		X	X	X
13M		1808			325-300		X	X	X
14M		1120			350-323		X	X	X
15M		1151			375-349		X	X	X
16M		1230			400-374		X		X
17M		1307			500-400		X		
18M		1353			700-500		X		X
19M		1558			900-700		X		
20M		1115			1200-900		X		
21M		1300			1500-1200		X		
1P	6-8-71	1515	85° 08'	89° 40'	10-0	1793	X		
2P		1525			25-10		X		
3P	6-9-71	2110			50-25		X		
4P		-----			75-50		X	X	
5P		1430			100-75		X	X	X
6P		1445			125-100		X	X	X
7P		1505			150-125		X	X	X
8P		1525			175-151		X	X	X
9P		1550			200-175		X	X	X
10P		1610			225-200		X	X	X
11P		1640			250-225		X	X	X
12P		1710			275-251		X	X	X
13P		1840			300-275		X	X	X
14P		1910			325-300		X	X	X
15P		1945			350-324		X	X	X
16P		2025			374-349		X	X	X
17P	6-10-71	2100	84° 56'	88° 10'	400-375	2043	X		
18P		2140			500-399		X		
19P		-----			700-500		X		
20P		-----			900-700		X		
21P		-----			1200-900		X		
22P		-----			1500-1198		X		
23P		1450			10-0		X		X
24P		1510			25-10		X	X	X
25P		1515			50-25		X	X	X
26P		1550			75-50		X	X	X
27P		1600			100-75		X	X	X
28P		-----			125-99 1/2		X	X	X
29P		-----			150-125		X	X	X
30P		-----			175-150		X	X	X
31T	6-23-71	1834	84° 56'	88° 13'	200-175	2096	X	X	X
32T		1907			225-199		X	X	X
33T		1935			250-224		X	X	X
34T		2000			275-250		X	X	X
35T		2030			300-275		X	X	X
36Mo		2100			325-299		X	X	X
37Mo		0930			350-324 1/2		X	X	X
38P		1010			375-349		X	X	X
39P		1050			400-374 1/2		X	X	X
40Mo		1330			500-492		X	X	X
41Mo		1425			700-499		X	X	X
42T		1803			900-700		X	X	X
43T		1952			1200-901		X	X	X
44T		2205			1500-1202		X	X	X
45P	6-24-71	0045	84° 46'	88° 28'	200-0-1498	1989	X	X	X
46P	7-6-71	1425			10-0		X	X	X

STATION NUMBER	DATE	TIME	LOCATION		COLLECTION DEPTH	BOTTOM DEPTH	SORTED TO GROUPS NOT SORTED TO GROUPS	CHAETOGNATHA			APPENDICULARIA		
			LATITUDE N.	LONGITUDE W.				1	2	3	1	2	3
41P	7-7-71	1435	84° 42'	86° 48'	25-10	2008	X						
48P		1445			50-25		X						
49P		1335			75-50 1/2		X		X		X		
50P		1400			100-75		X		X				
51P		1425			125-100		X		X		X		
52P		1440			150-125 1/2		X		X				
53P		1505			175-150		X		X		X		
54P		1525			200-175		X		X		X		
55P		1600			225-200		X		X				
56P		1617			250-225		X		X				
57P		1700			275-250		X		X		X		
58P		1830			300-275		X				X		
59P		1900			325-300		X						
60P		1930			350-324		X				X		
61P		2006			375-350		X				X		
62P		2042			400-375		X						
63P		2125			500-401		X						
64P		2235			700-500		X						
65P		2350			900-700		X						
66P	7-8-71	1435	84° 35'	87° 28'	1200-899	1903	X				X		
67P	7-19-71	1640			1500-1202		X				X		
68P		2205			10-0		X						
69P	7-20-71	2210			25-10		X				X		
70P		2220			50-25		X		X		X		
71P	7-20-71	0657			75-50		X		X		X		
72P		0711			100-75		X						
73P	7-21-71	1326			125-100	1891	X		X		X		
74P		2352			150-125		X		X		X		
75P		1408			175-150		X		X				
76P		1427			200-175		X						
77P		1447			225-200		X		X				
78P		1305			250-225		X				X		
79P		1330			275-251		X						
80P		1403			300-275		X						
81P		1435			325-300		X						
82P		1512			350-325		X						
83P		1550			375-350		X						
84P		1625			400-374		X						
85P		1700			500-400		X						
86P		2000			700-499		X						
87P		2110			900-700		X				X		
88P	7-22-71	1510			1200-898	1890	X						
89P		2015			1500-1200		X				X		
90P	8-3-71	1345	84° 41'	85° 45'	10-0	2030	X						
91P		1350			25-10		X		X				X
92P		1410			50-25		X		X				X
93P		1515			75-50		X		X				X
94P		1530			100-75		X		X				X
95P		1640			125-100		X						
96P		1700			1500-125		X		X				
97P		1845			175-150		X						X
98P		1905			200-175		X						
99P		1930			225-200		X		X				
100P		2000			250-224		X		X				X
101P		2030			275-250		X						
102P		2055			300-275		X						X
103P		2115			325-300		X						
104P		2246			350-325		X						
105P		2316			375-351		X						
106P		2348			400-374		X		X				
107P	8-4-71	0030			500-401	2003	X		X				
108P		0140			700-499		X						
109P		0240			900-700		X						
110P		1410			1200-898		X						
111P		1555			1500-1202		X						
112P	8-17-71	0940	84° 43'	86° 33'	10-0		X						
113P		1000			25-10		X						
114P		1000			50-25		X						
115P		1045			75-50		X						
116P		1101			100-75		X		X				
117P		1115			125-99		X		X				
118P		1145			150-124		X						
119P		0445			175-150		X						
120P													
121P													
122P													
123P													
124P													
125P													
126P													
127P													
128P													
129P													
130P													

34

STATION NUMBER	DATE	TIME	LOCATION		COLLECTION DEPTH	BOTTOM DEPTH	SORTED TO GROUPS NOT SORTED TO GROUPS	CHAETOGNATHA			APPENDICULARIA		
			LATITUDE N.	LONGITUDE W.				1	2	3	1	2	3
120P	8-19-71	0611	84° 42'	86° 33'	200-176	2020	X		X				
121P		0648			225-201		X		X			X	
122P		0618			250-224		X					X	
123P		0647			275-249		X						
124P		0718			300-274		X					X	
125P		0845			325-300		X					X	
126P		0923			350-324		X						
127P		1002			375-349		X					X	
128P		1042			400-373		X						
129P		1130			500-400		X					X	
130P		0424			700-497		X					X	
131P		0550			900-699		X					X	
132P	8-31-71	0740	84° 59'	82° 29'	1200-905	2020	X					X	
133P		0950			1500-1198		X					X	
134P		1240			2000-1503		X					X	
135P		1330			10-0		X					X	
136P		1345			25-10		X		X				
137P		1355			50-25		X		X			X	
138P		1430			75-49 1/2		X		X			X	
139P		1440			100-74		X		X				
140P		1455			125-99		X						
141P		1510			150-125		X		X				
142P		1530			175-149		X		X				
143P		1550			200-175		X		X			X	
144P	9-2-71	1610	84° 50'	85° 22'	225-199 1/2	2101	X						
145P		1635			250-224		X		X			X	
146P		1710			275-250		X		X			X	
147P		1910			300-276		X					X	
148P		1945			325-300		X		X				
149P		2015			350-323		X		X			X	
150P		2045			375-350		X					X	
151P		2135			400-375		X					X	
152P		2220			500-398		X					X	
153P		1540			700-500		X		X			X	
154P		1700			900-700		X					X	
155T		1808			1200-898		X					X	
156T	9-13-71	2051	84° 50'	85° 22'	1500-1203	2101	X					X	
157T		2325			2000-1506		X					X	
158P		2150			10-0		X					X	
159P		2100			25-0		X		X			X	
160P		2110			50-25		X		X			X	
161P		2140			75-50		X		X			X	
162P		2200			100-75		X		X			X	
163P		0910			125-100		X		X				
164P		0932			150-125		X		X			X	
165P		0948			175-150		X						
166P		1007			200-174		X					X	
167P		1028			225-199		X						
168P	9-14-71	1050	84° 59'	84° 18'	250-224	2101	X		X			X	
169P		1113			275-249		X					X	
170P		1139			300-275		X					X	
171P		1420			325-299		X					X	
172P		1450			350-324		X					X	
173P		1525			375-351		X						
174P		1555			400-374		X		X				
175P		1635			500-400		X						
176P		1602			700-499		X					X	
177P		1410			900-699		X						
178P		1120			1200-963		X						
179P		0009			1500-1204		X					X	
180P	9-14-71	2210	84° 59'	84° 18'	2000-1510	2101	X		X			X	
181E1	9-28-71	1630			10-0		X					X	
182E1		1635			25-10		X		X			X	
183E1		1645			50-25		X		X			X	
184E1		1705			75-50		X		X			X	
185E1		1715			100-75		X		X			X	
186E1		1835			125-100		X		X				
187E1		1880			150-125		X						
188E1		1905			175-150		X		X			X	
189E1		1920			200-175		X		X			X	
190E1		1940			225-200		X		X			X	
191E1		2000			250-225		X		X			X	
192E1		2020			275-250		X		X			X	

STATION NUMBER	DATE	TIME	LOCATION		COLLECTION DEPTH	WATER DEPTH	SORTED TO GROUPS	NOT SORTED TO GROUPS	CHAETOGNATHA		APPENDICULARIA	
			LATITUDE N.	LONGITUDE W.					1	2	1	2
103E1		2040			300-275		X					X
104E1		2100			325-300		X					X
105E1		2125			350-325		X					X
106E1		2215			375-350		X			X		X
197E1		2245			400-375		X					
198E1		2315			500-400		X					
199E1		2355			700-500		X					
200E1	9-2-71	1830			900-700		X					
201E1		2005			1200-900		X			X		X
202E1		2130			1500-1200		X					X
203E1		2315			2000-1500		X					X
1M	10-15-71	1520	85° 11'	79° 04'	2000-1505	2067	X					X
2W	10-16-71	1015			1500-1195			X				
3W		1500			1200-898			X				
4W		1635			1500-1200			X				
5W	10-17-71	1415			1500-1200			X				
6W		1600	85° 13'	77° 44'	1500-1215		X					X
7W		1920			1200-900		X					X
8W		2042			900-702		X					X
9W		2140			700-501		X					
10W	10-18-71	1133			500-402		X					
11W		1232			400-376		X					
12W		1302			375-351		X					X
13W		1340			350-325		X					
14W		1410			325-301		X			X		
15W		1440			300-275		X					
16W		1510			275-250		X					
17W		1540			250-225		X			X		X
18W		1605			225-200		X					X
19W		1629			200-175		X			X		X
20W		1648			175-150		X					X
21W		1902			150-124		X			X		X
22W		1918			125-100		X					X
23W		1935			100-75		X			X		X
24W		1955			75-50		X			X		X
25W		2005			50-24		X			X		X
26W		2017			25-10		X			X		X
27W		2028			10-0		X			X		X
1W	10-27-71	1643	85° 12'	82° 05'	2000-1501	2091	X					X
2W		1925			1500-1208		X			X		X
3W		2115			1200-901		X					X
4W	10-28-71	0850			900-698		X					X
5W		0955			700-500		X					X
6W		1123			500-401		X					
7W		1330			400- ?			X				
8W		1420			400- ?			X				
9W		1525			400-374		X					X
10W		1605			375-350		X					
11W		1645			350-325		X			X		X
12W		1720			325-300		X			X		X
13W		1915			300-274		X					X
14W		1945			275-250		X			X		X
15W		2015			250-225		X			X		X
16W		2040			225-200		X					X
17W		2110			200-175		X			X		X
18W		2135			175-150		X			X		X
19W	10-29-71	0845			150-125		X			X		X
20W		0910			125-100		X			X		X
21W		0935			100-75		X			X		X
22W		1010			75-50		X			X		X
23W		1125			50-25		X			X		X
24W		1145			25-10		X			X		X
25W		1200			10-0		X			X		X
1W	11-10-71	1325	84° 36'	84° 48'	1500-1201	1653	X					X
2W		1513			1200-903		X					X
3W		1630			900-703		X					X
4W		1855			700-500		X					X
5W		1945			500-402		X					X
6W	11-11-71	1045			400-376		X					
7W		1115			375-350		X					
8W		1150			350-325		X					
9W		1315			325-300		X					
10W		1345			300-275		X					X

STATION NUMBER	DATE	TIME	LOCATION		COLLECTION DEPTH	DEPTH DEPTH	SORTED TO GROUPS	NOT SORTED TO GROUPS	CHAETOGSATHA		APPENDICULARIA		
			LATITUDE N.	LONGITUDE W.					1	2	1	2	3
11N	11-27-71	1412	84° 37'	83° 42'	275-252	1989		X					
12N		1440			275-250		X						
13N		1525			250-225		X						
14N		1555			225-200		X						X
15N		1620			200-175		X						
16N		1640			175-150		X						
17N		1705			150-124		X			X			X
18N		1828			125-100		X			X			X
19N		1850			100-75		X			X			X
20N		1910			75-50		X						X
21N		1935			50-25		X			X			X
22N		1952			25-0			X					
23N		2000			25-10		X			X			X
24N		2015			10-0		X						X
25N		2030			1500-1208		X						X
26N		0935			1200-857		X						X
27N		1220			900-695			X					
28N		1340			700-493		X						X
29N		1500			500-401		X						X
30N		1545			400-376		X						
31N	11-28-71	1642			375-350		X						
32N		1720			350-324			X					
33N		1845			325-300		X						X
34N		1933			300-274		X						X
35N		2019			275-250		X			X			X
36N		2040			250-224		X			X			X
37N		2123			225-200		X			X			X
38N		2150			200-176		X			X			X
39N		2225			175-150		X			X			X
40N		0835			150-125		X						X
41N	11-29-71	0900			125-100		X			X			X
42N		0942			100-75		X			X			X
43N		1005			75-50		X			X			X
44N		1043			50-25		X						X
45N		1100			25-10		X			X			X
46N		1123			10-0		X			X			X
47a		1325	84° 49'	81° 30'	10-0	1997	X			X			X
48a		1345			25-10		X						X
49a		1400			50-25		X			X			X
50a		1432			75-50		X			X			X
51a		1455			100-74		X			X			X
52a		1520			125-100		X			X			X
53a		1548			150-125		X			X			X
54a		1630			175-151		X			X			X
55a		1650			200-172		X			X			X
56a		1050			225-199		X			X			X
57a	1-4-72	1250			250-223		X			X			X
58a		1330			275-245		X			X			X
59a		1435			300-270		X			X			X
60a		1520			325-295		X			X			X
61a		1600			350-318		X						X
62a		0920	84° 40'	83° 16'	375-345	1958	X						X
63a		0955			400-370		X						
64a		1035			500-392		X						X
65a		1318			700-491		X						X
66a		1420			900-697		X						X
67a		1540			1200-695		X						X
68a		0845			1500-1195	1999	X						X
69a		1050			350-320			X					
70a		1305			10-0		X						X
71a		1315			25-10		X						X
72a	1-5-72	1325			50-25		X						X
73a		1403			75-50		X						X
74a		1417			100-74 1/2		X			X			X
75a		1433			125-109 1/2		X			X			X
76a		1449			150-124 1/2		X			X			X
77a		1505			175-151		X						X
78a		1524			200-175 1/2		X			X			X
79a		1543			225-200		X			X			X
80a		1612			250-224		X			X			X
81a		1640			275-249		X			X			X
82a	2-1-72	1320	84° 20'	86° 19'	300-274	1847	X						X
83a		1347			325-299		X						X
84a													

Table XII

STATION NUMBER	DATE	TIME	LOCATION		COLLECTION DEPTH	BOTTOM DEPTH	SORTED TO GROUPS NOT SORTED TO GROUPS	CHAETOCERATRA			APPENDICULARIA		
			LATITUDE N.	LONGITUDE W.				1	2	3	1	2	3
38R	2-2-72	1410			350-325 1/2		X						X
39R		1444			375-348 1/2		X		X				X
40R		1515			400-374 1/2		X		X				X
41R		1550			500-398		X		X				X
42R		0930			700-500 1/2		X						X
43R		1028			900-701		X						X
44R		1350			1200-902		X						X
45R		1535			1500-1205		X						X

